

## SPECIAL CONTRIBUTIONS.

## AN ENDEAVOR TO DISCOVER ELECTRODYNAMIC RADIATIONS FROM THE SUN.

By Prof. JOHN TROWBRIDGE, Director of the Jefferson Physical Laboratory, Cambridge, Mass.

J. Wilsing and J. Scheiner, of the Astrophysical Observatory at Potsdam, give in the *Astronomische Nachrichten*, Band 142, No. 3386, a review of the various ways of detecting electrical waves, and conclude by a short description of the method they have adopted to detect electro-dynamic radiations from the sun. Passing over the elementary account of the various forms of Hertz oscillators, in which, by the way, Lebedew's apparatus for obtaining short electric waves is described without reference to Rhigi's earlier work in the same direction, we come to the form of apparatus which the authors used. It consists essentially of a Wheatstone's bridge with variable contacts, the resistance of which is modified by electrical oscillations. This form of apparatus has been used by various investigators, especially by Lodge. In the hands of Wilsing and Scheiner it was competent to show the existence of electrical oscillations arising from a source many feet distant. Notwithstanding the effects of direct heat radiations were excluded, and also the disturbing effect of vibrations, no deflections were observed which could be attributed to electro-dynamic radiations from the sun. It is doubtful if such radiations can be detected by the arrangement adopted by the authors, unless it is made extraordinarily sensitive. In this condition it would be affected by slight jars and mechanical vibrations. One should repair to an isolated mountain peak to carry out such experiments.

## SUNSTROKE WEATHER OF AUGUST, 1896.

By W. F. R. PHILLIPS, M. D., in charge of the Section of Climatology.

The abnormal heat that prevailed over the eastern two-thirds of the United States during the last few days of July, and the first twelve days of August, 1896, suggested to the Chief of the Weather Bureau, the propriety of studying the subject of sunstrokes, in so far as it is connected with and dependent upon meteorologic conditions.

With this object in view he directed that the following circular, asking for information, be sent to different hospitals located in the affected region, and also to others from whom useful information might be secured.

U. S. DEPARTMENT OF AGRICULTURE,

WEATHER BUREAU,

Washington, D. C., August 20, 1896.

The large number of casualties reported by the newspaper press as attributed directly to the effects of the recent hot spell of weather that prevailed extensively over the country, especially the eastern part, has suggested to the Weather Bureau the propriety of studying the subject of sunstroke in so far as it is connected with and dependent upon the meteorologic conditions, in order that the weather forecasts issued by the Bureau may, if possible, be given an additional general value.

With this object in view, the Bureau would request those into whose hands this circular may come to give the information, if any, in their possession, provided for in the subjoined blank as completely as practicable, and to return the same in the addressed franked envelope, herewith inclosed.

Should the results of the contemplated investigation be deemed of sufficient value, they will be published for public distribution.

WILLIS L. MOORE,

Chief of Bureau, and Acting Secretary of Agriculture.

The information obtained seemed to be of such importance that he gave specific instructions to the writer to make compilation and study of the same, with the result as herein stated.

In this paper and the accompanying statistical tables the

term sunstroke is used to include a variety of morbid conditions, in accordance with the general practice of physicians, as defined by the following quotation from the article on "Sunstroke," contributed by Sir Joseph Fayrer, to the work entitled *A System of Medicine*, edited by T. C. Allbutt:

Under the designation sunstroke, heat stroke, insolation, etc., a variety of morbid conditions, from the simplest to the gravest, are included. However these conditions may be modified by personal susceptibility, local surroundings, and climatic influences, they are essentially due to heat and are the result of direct exposure to the rays of the sun or to a high atmospheric temperature in the shade.

To those unacquainted with medical affairs it may be stated that the general inclination among pathologists is to consider excessive atmospheric heat, natural or artificial, as the chief extrinsic factor in the causation of sunstroke, using the term as above defined. As to the relative importance of the other atmospheric conditions, they are regarded as auxiliaries that may be more efficient at one time than at another, depending upon the physical state of the individual. The particular degree of heat that can be endured without injury or that may be required to produce sunstroke has not been definitely established. Both will depend upon contingencies, which will be mentioned further on.

It is generally accepted that the injurious action of heat is primarily exerted upon the nervous system to disarrange, in one way or another, the complex and nice adjustments existing between the physiologic processes concerned in the production of heat and the loss of heat. The manifestations of the morbid effects of heat, as seen in sunstroke, may be broadly divided into two categories. In one there is a fall of the temperature of the body below its normal; the skin is pale and cool and covered, more or less, with a clammy perspiration. This is the general class—heat exhaustion or prostration. The other class is characterized by a rise in the temperature of the body above the normal to a state of fever; the skin is usually red, hot, and dry. This is the general condition to which some writers would alone restrict the term sunstroke; it is probably best described as thermic or heat fever. Between these two categories there is no hard and fast line of demarcation, and cases may be seen which present some of the characteristics of each class, or which primarily falling in one category subsequently pass over to the other.

In connection with the following statistics of sunstroke cases and mortality, it should be stated that every effort has been made to avoid duplication of facts, and it is believed that whatever errors, if any, have crept in through this avenue they are too small to vitiate the general result. Perhaps the most serious source of doubt will be found subsisting in the matter of diagnosis; but possible error of diagnosis is a defect inherent to all statistics dealing with disease, and which can not be avoided in the present case any more than in the great number of other cases where statistics are invoked to throw light upon the relation of health to environment.

It must be borne in mind that the meteorologic data, though determined by instruments of precision can not be assumed to represent all the variations of the weather to which the human being may be subjected in the course of the day, even though both may be in the same neighborhood, because meteorologic instruments are exposed under fixed conditions, whereas man is continually changing his local surroundings, and with each change either of place or occupation, he alters more or less his meteorologic environment and its effects upon him. It is this difference in the circumstances of exposure that renders it impracticable to state